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FIG. 1

Title: TRANSGENIC PLANTS EXPRESSING A MAPKKK
PROTEIN KINASE DOMAIN

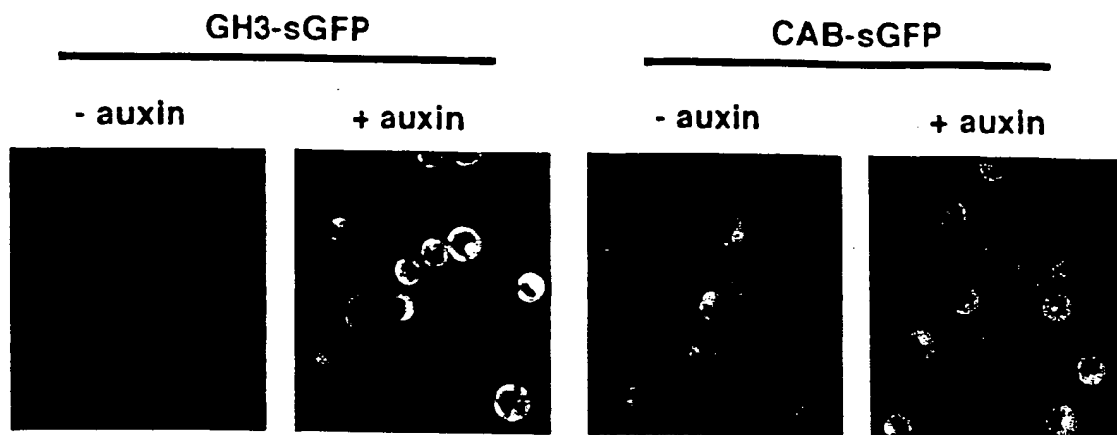
Applicant(s): Jen Sheen et al.

Filing Date: August 19, 2003

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Customer No.: 21559

a



b

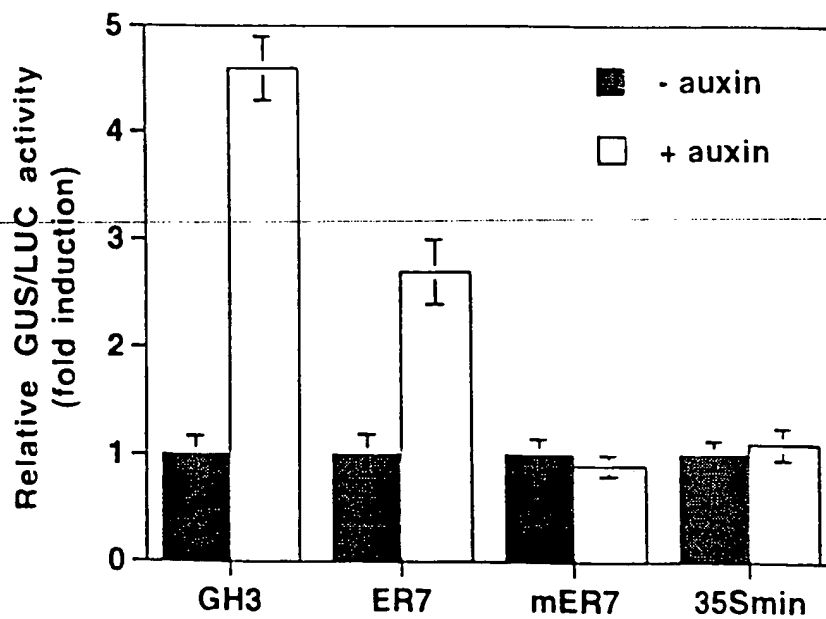
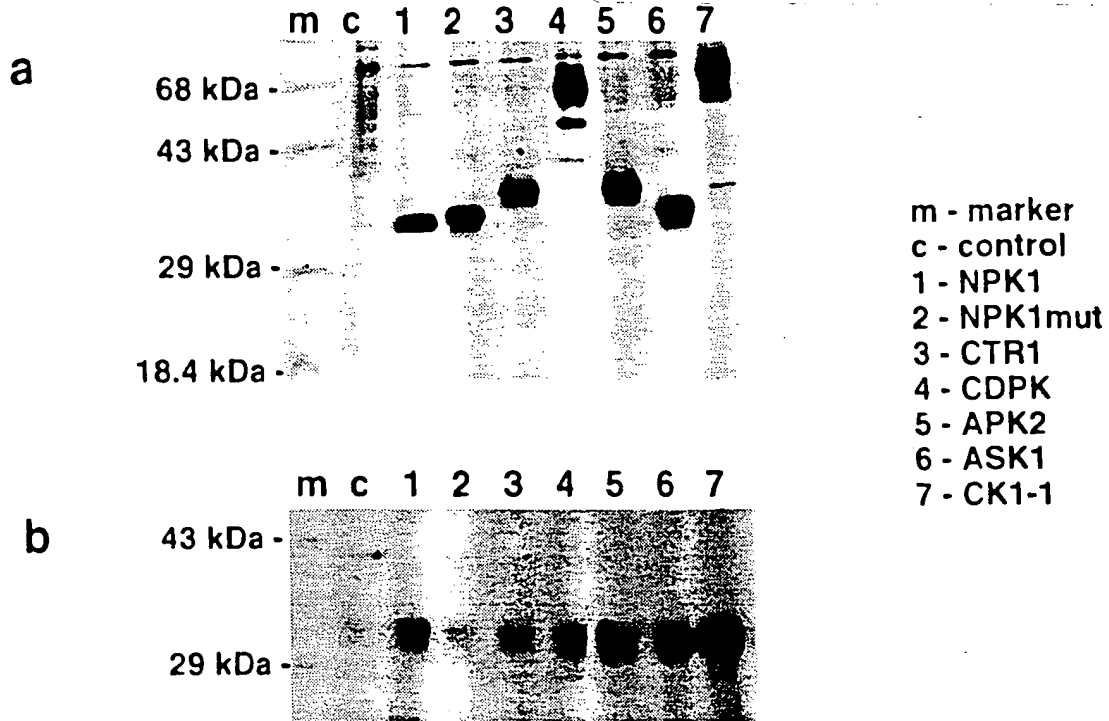


Fig. 2



c

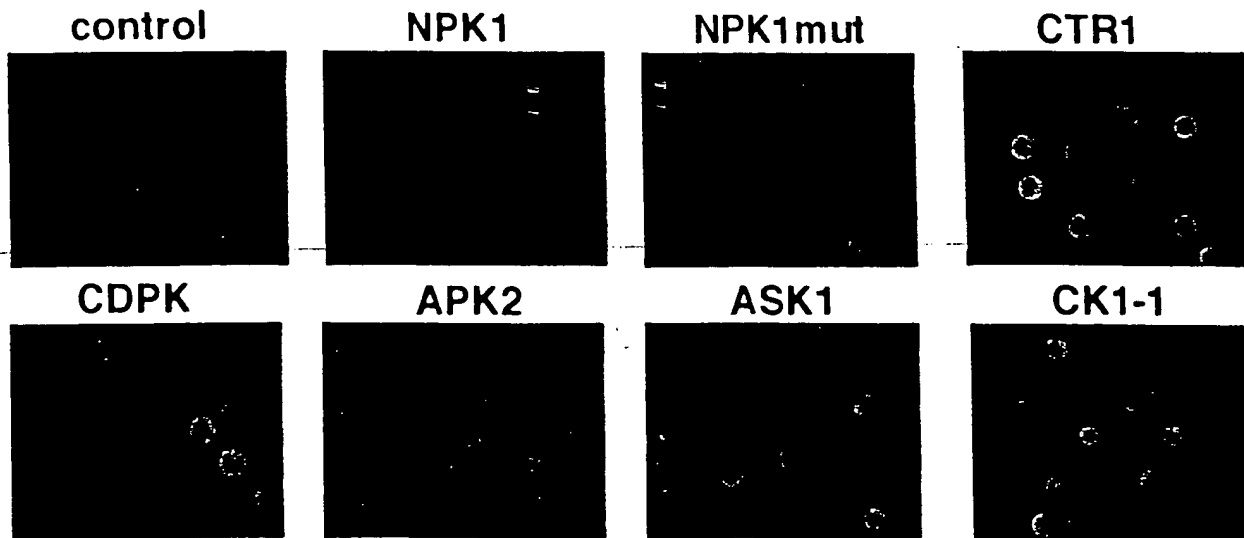
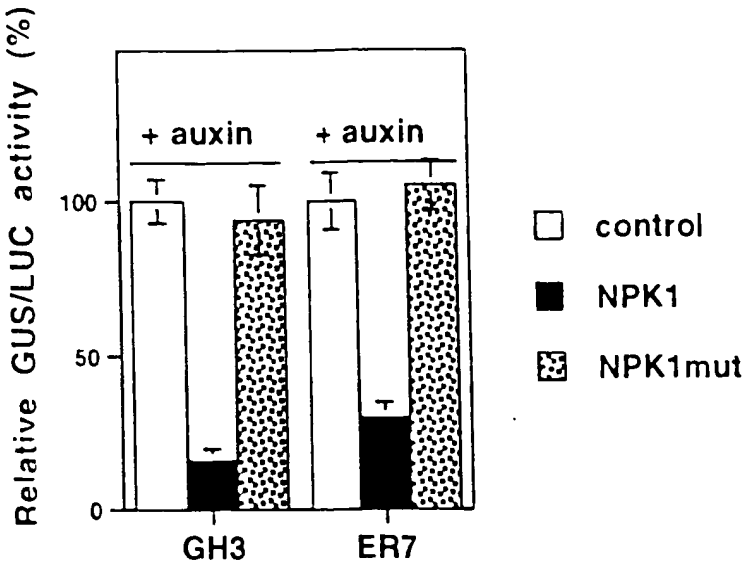


FIG. 2

d



e

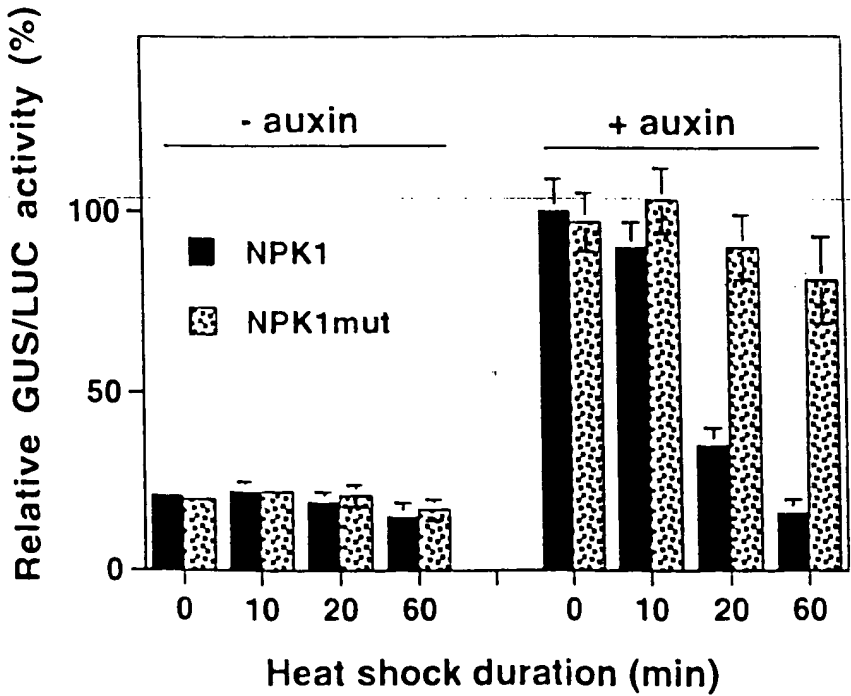
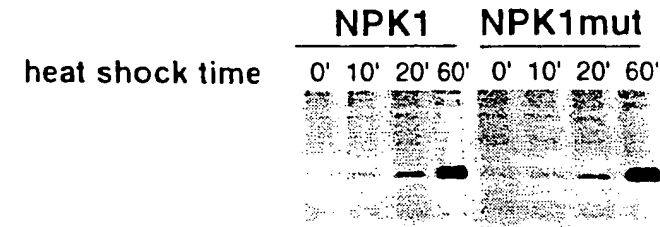
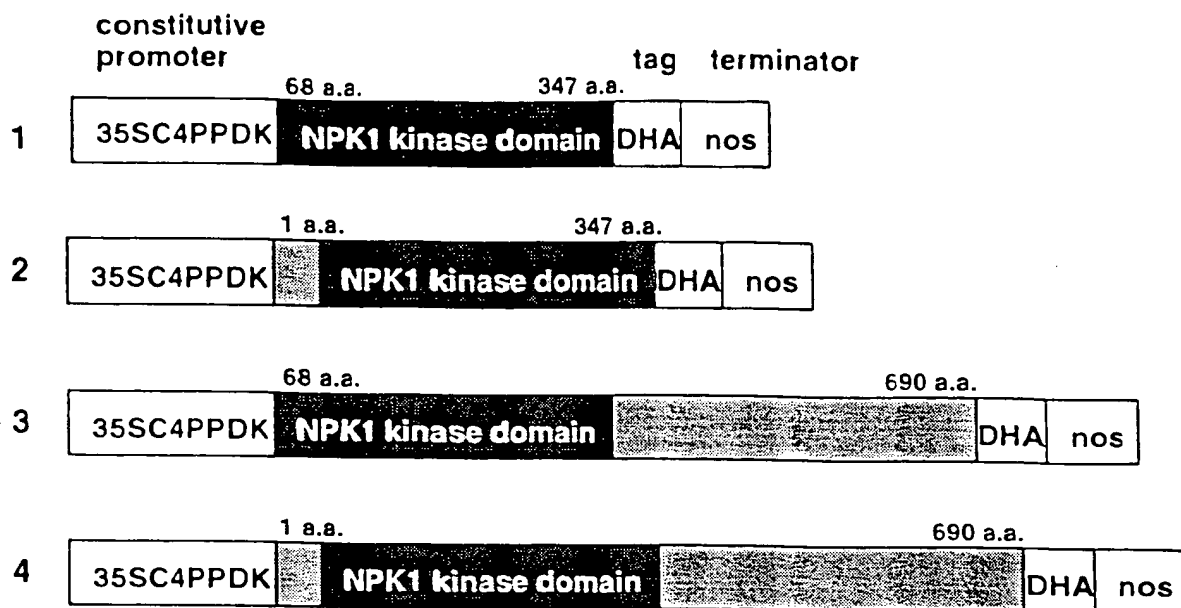
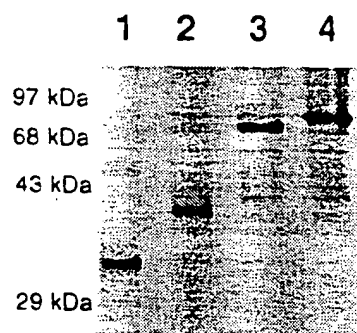


FIG. 3

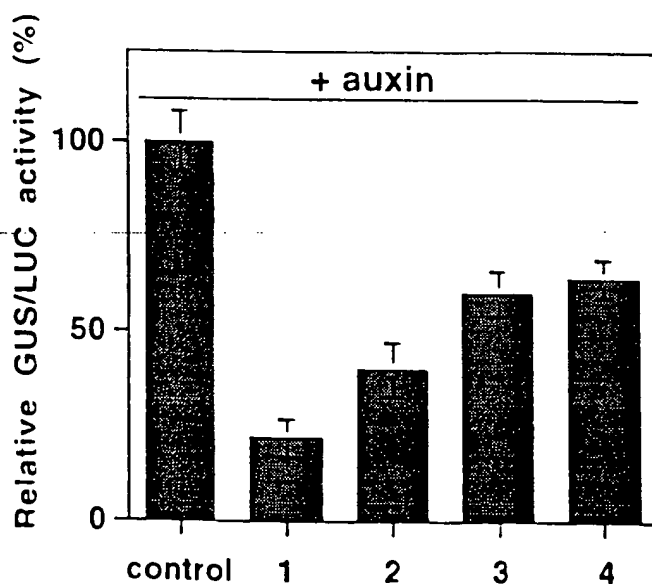
a



b



c



Title: TRANSGENIC PLANTS EXPRESSING A MAPKKK
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Applicant(s): Jen Sheen et al.

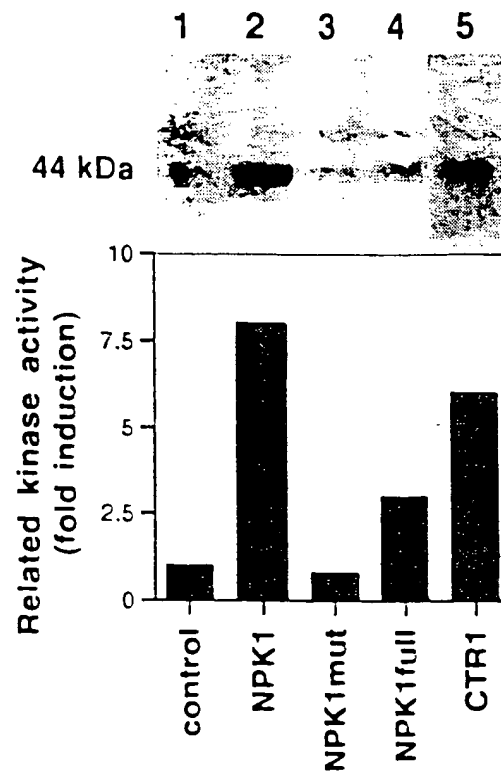
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FIG. 4

a



b

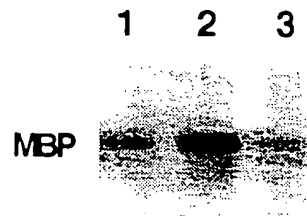


FIG. 4

Title: TRANSGENIC PLANTS EXPRESSING A MAPKKK
PROTEIN KINASE DOMAIN

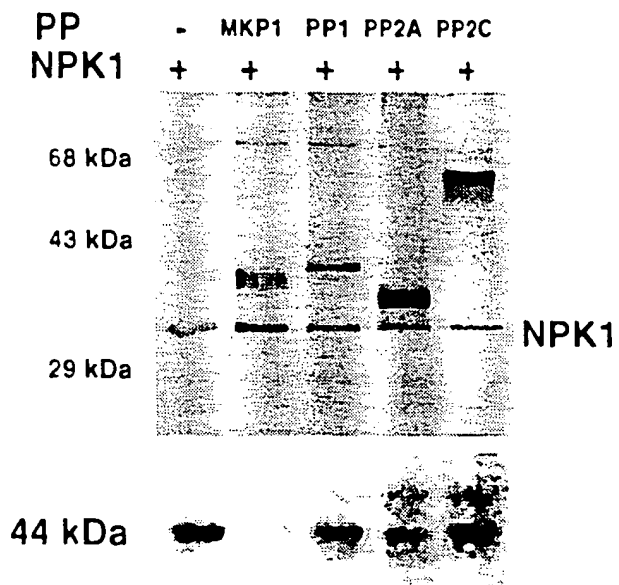
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C



d

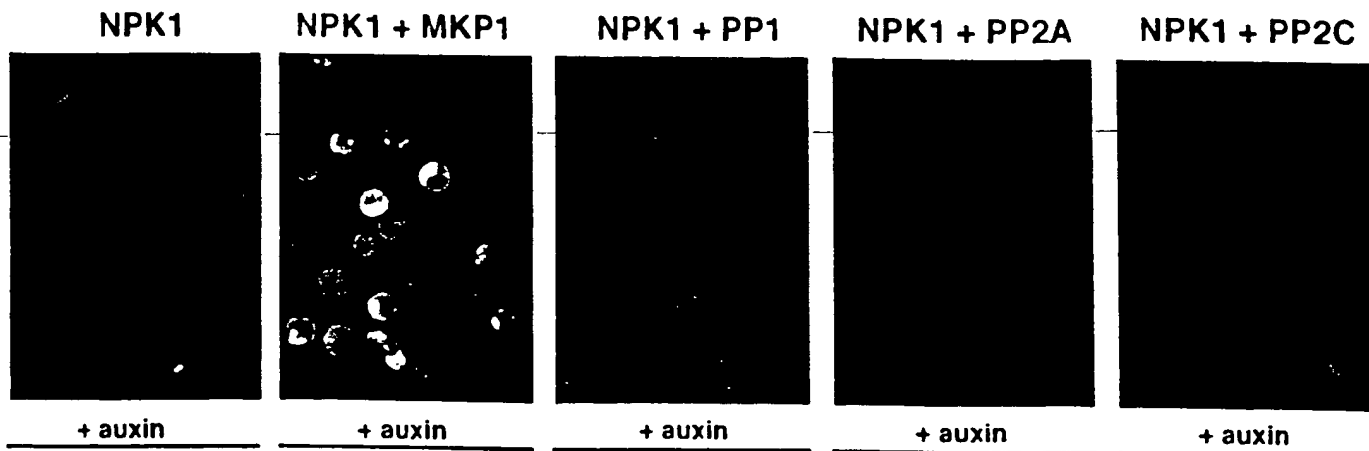


Fig. 5

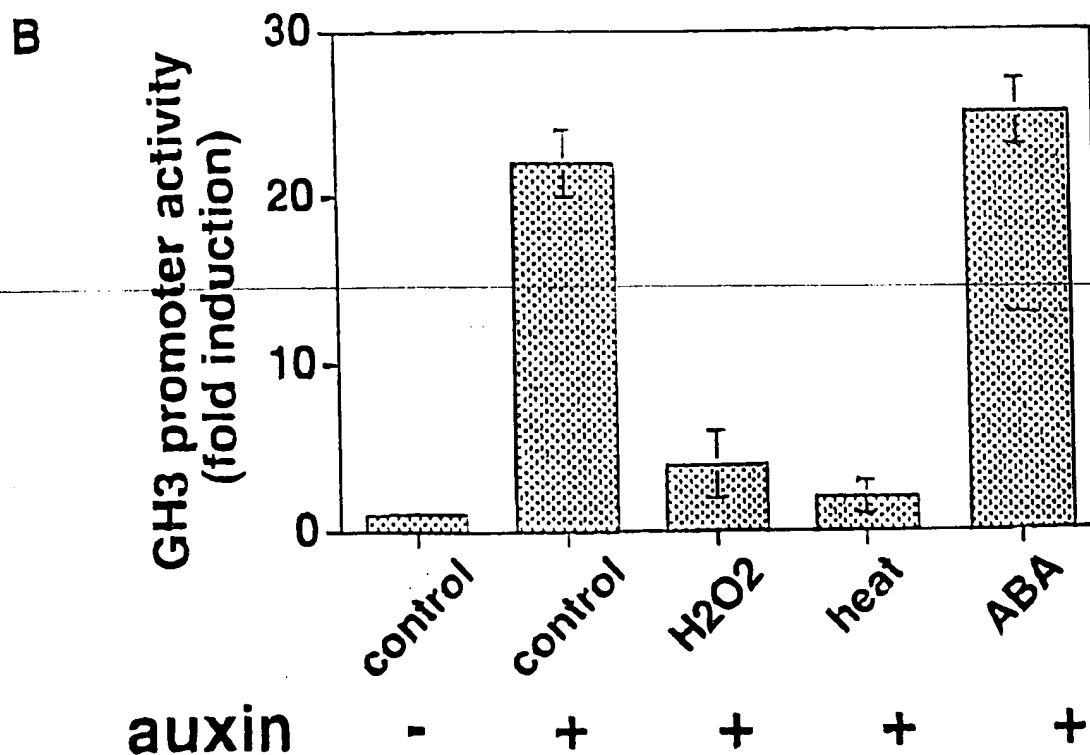
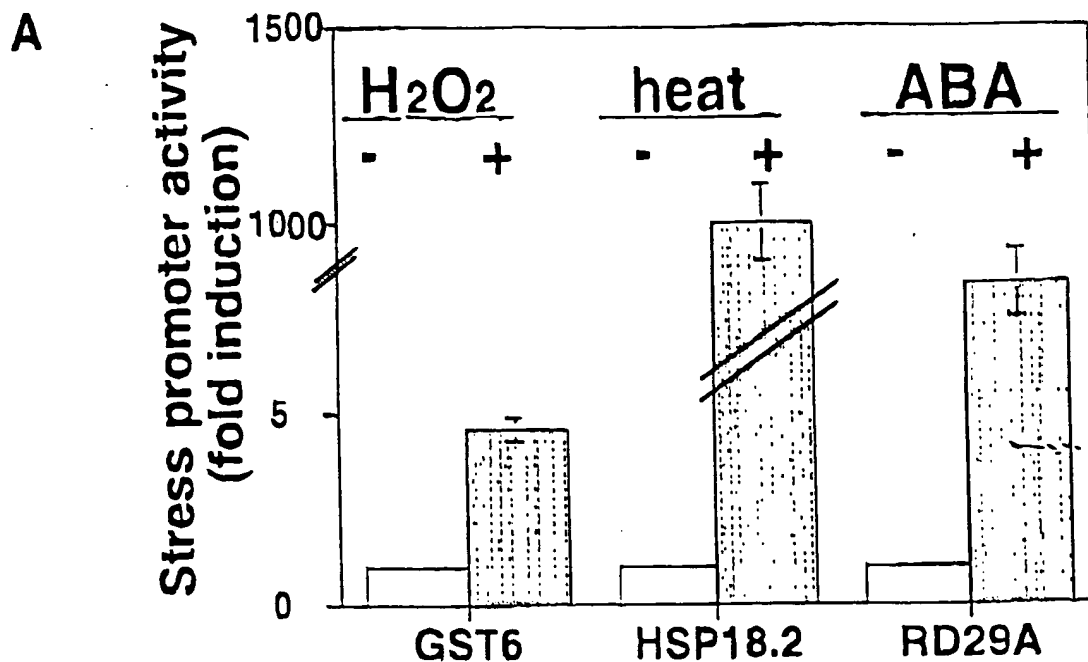


Fig. 6

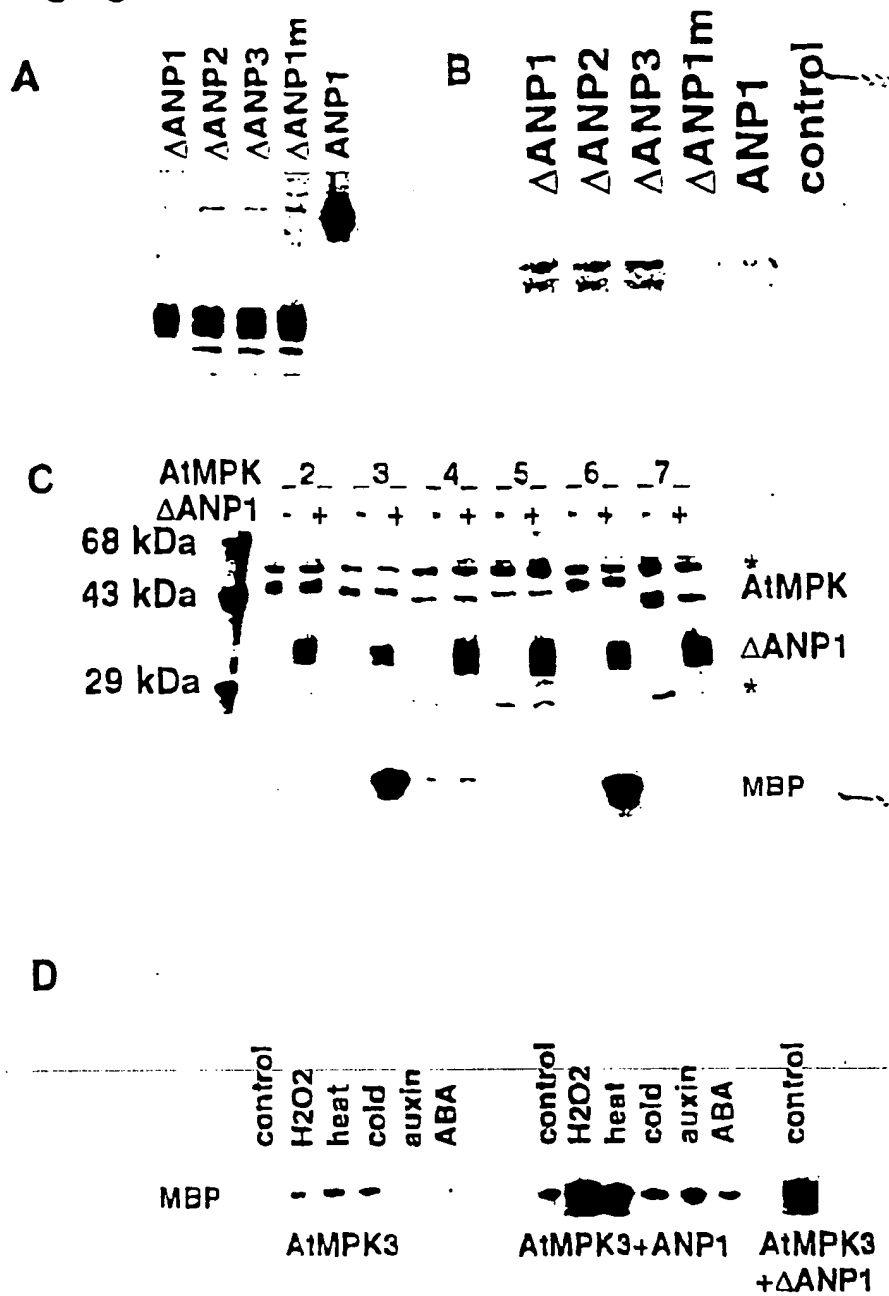


FIGURE 7A

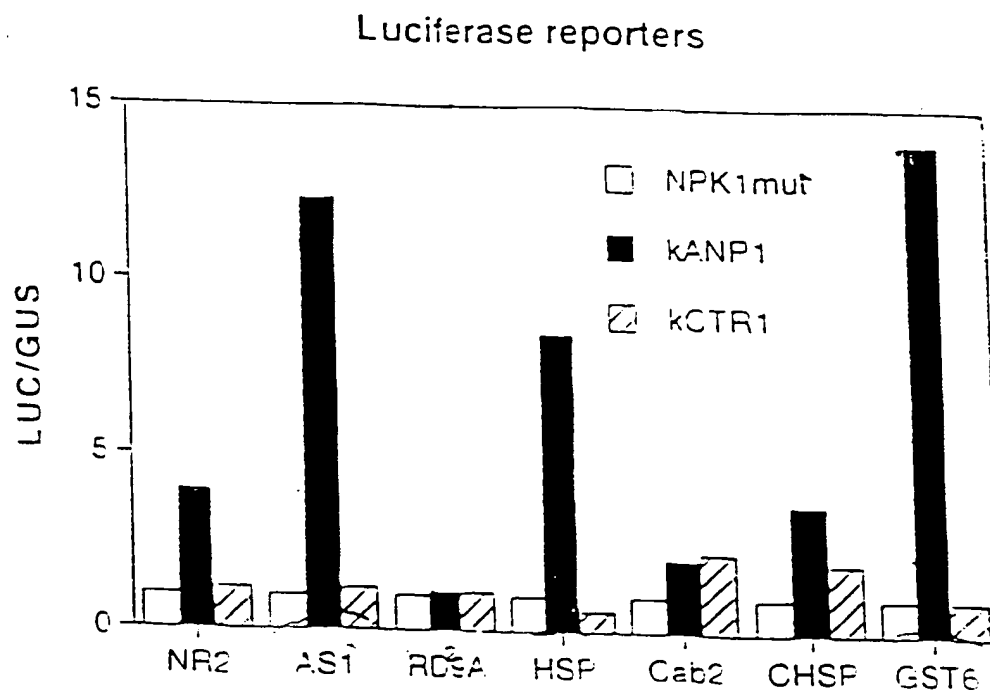
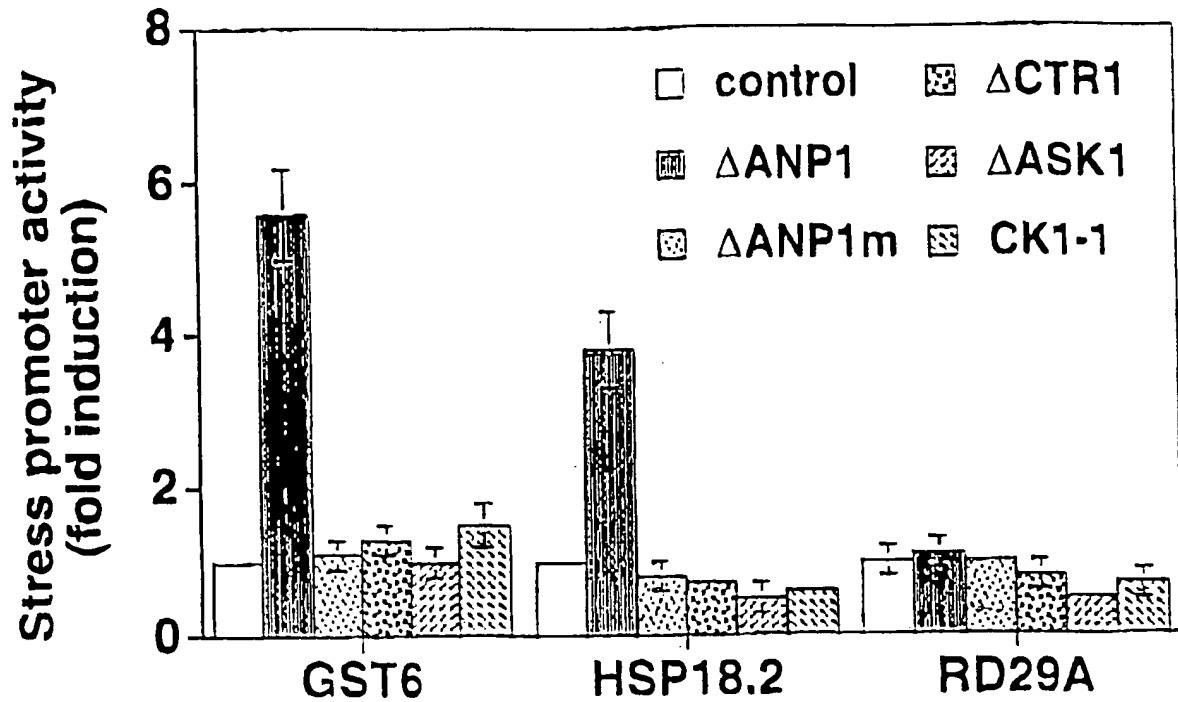
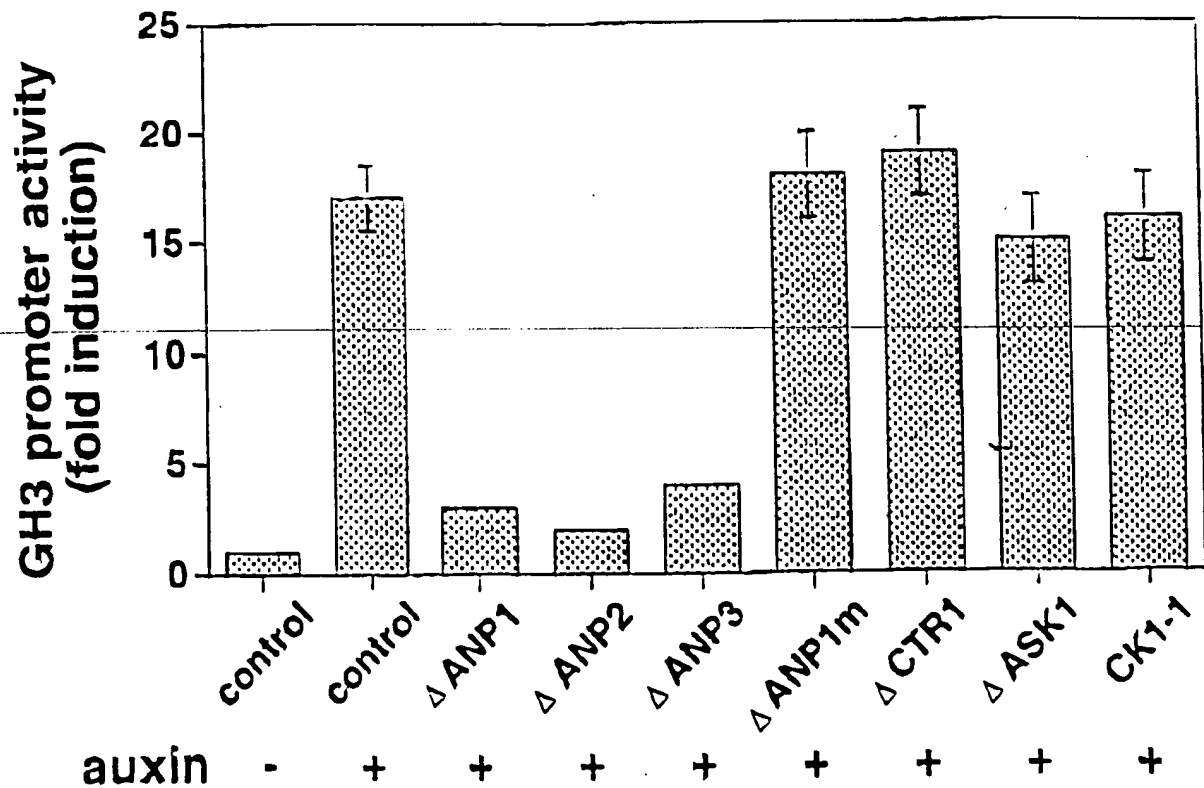


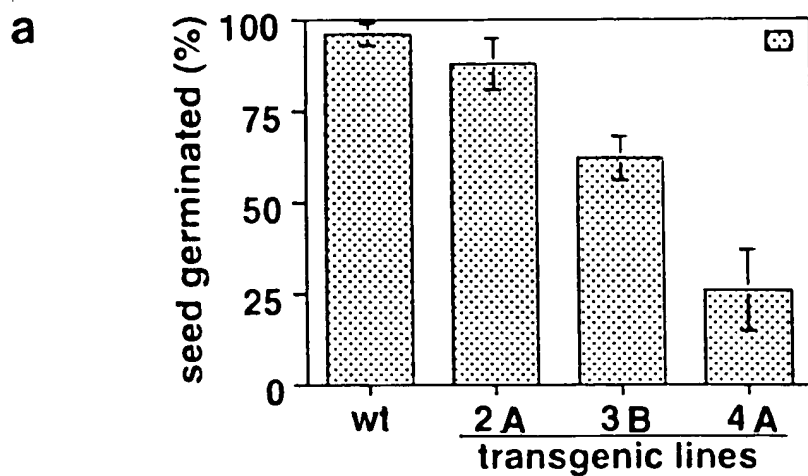
Fig. 7

B



C





b

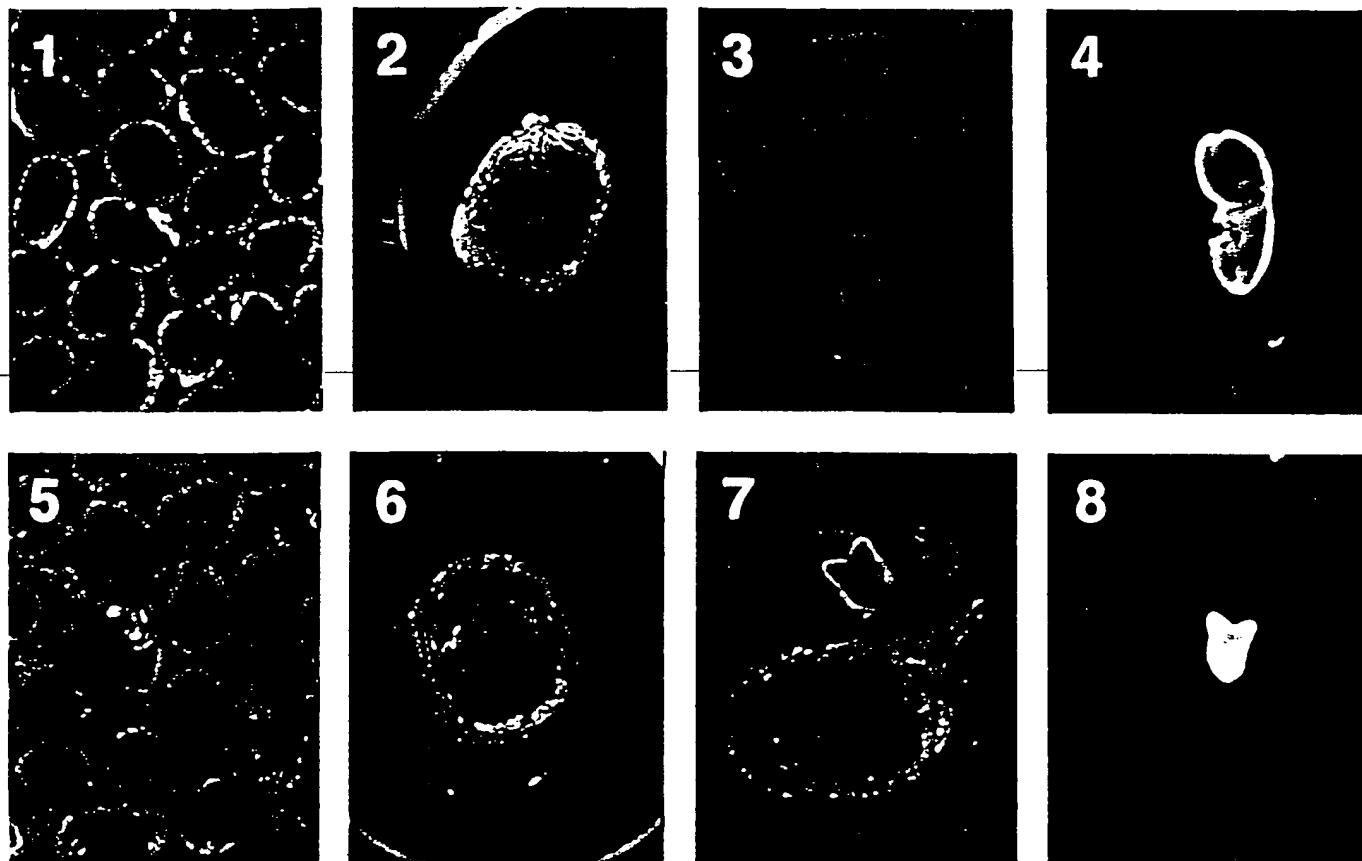
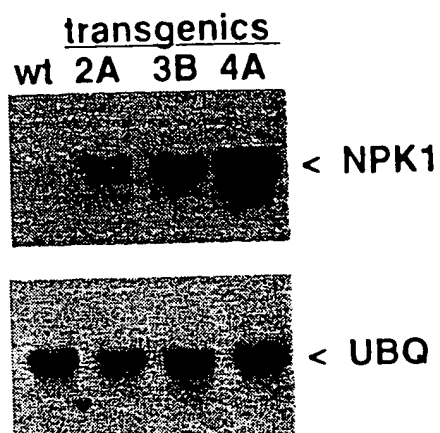


Fig. 8

c



d

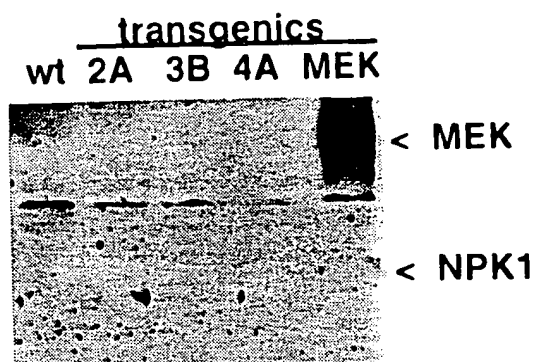


FIGURE 9

Wild type NPK1-A4

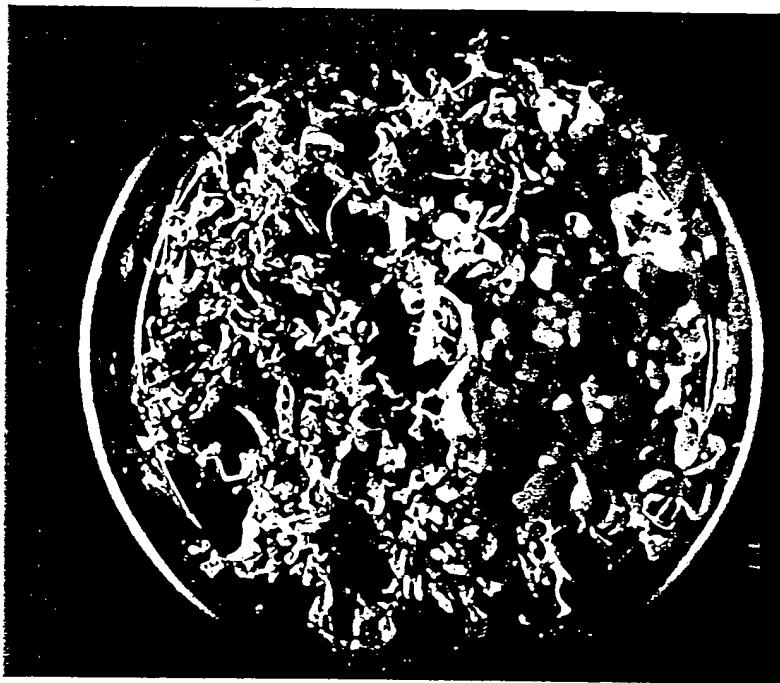
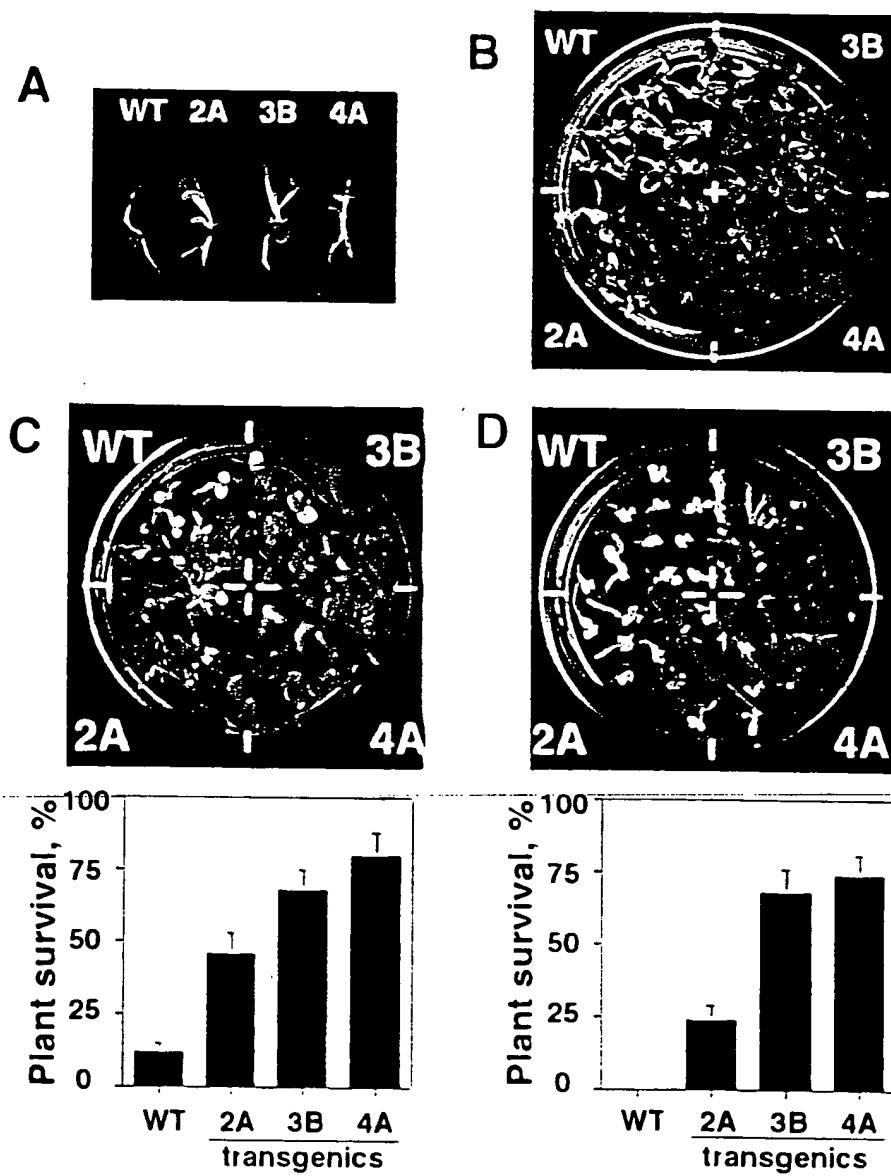


FIGURE 10



Title: TRANSGENIC PLANTS EXPRESSING A MAPKKK
PROTEIN KINASE DOMAIN

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ANP11 **QDDFGSVRRSLVFRPSSDDNQENQ-PPF** PGVLADK**ITSCIRKSNIFIKPSFS-BPPGA** NTVL-----MAPPI**SWRKGLIGRGA** 79
ANP1 **RSLVFRSTTDENQENHPPF** PSLLADK**ITSCIRKSNVFAKSOEP-PN--N** STVQ-----IKPPI**SWRKGLIGRGA** 69
ANP3 **QDDFGSVRRSLVFR-SELG-DDGTSGGG** LSGFVGK**INSSIRSSRIGLFSKPP-PGLDA** FRKE-----EAPSI**SWRKGLIGRGA** 78
NPK1 **QDDFGSVRRSLVFKQSGDFDTGAAGVGS** FGGFV**ETLGSIRKSSIGIFSKAHVPALES** ISKAELPAKARKDDT**PIRWRKGEMICGA** 90

ANP11 **PGTVTGMNLDSCGELLAVROVLIAPFASK** EKTQAH**IQELEPEVKLLRNLSHPNIVRYLG** TVREDDT**LNILLEFVPGGSISSLLKFGPF** 169
ANP2 **PGTVTGMNLDSCGELLAVROVLIAPFASK** EKTQAH**IQELEPEVKLLRNLSHPNIVRYLG** TVREDET**LNILLEFVPGGSISSLLKFGPF** 159
ANP3 **PGRVTMGMNLDSCGELLAVROVLIAPFASK** EKTQAH**IQELEPEVKLLRNLSHPNIVRYLG** TVRESDS**LNILLEFVPGGSISSLLKFGPF** 168
NPK1 **PGRVTMGMNLDSCGELLAVROVLIAPFASK** EKTQAH**IQELEPEVKLLRNLSHPNIVRYLG** TVREDS**LNILLEFVPGGSISSLLKFGPF** 180

ANP11 **PESVVRITTYNQALLGLEYLEHMAIMHRDIK** GANILVD**MKGCKLADFGASKQVVELATMT** GAKSMKGTP**YVMAPEVILQGHFSFADWS** 259
ANP2 **PESVVRITTYNQALLGLEYLEHMAIMHRDIK** GANILVD**MKGCKLADFGASKQVVELATMT** GAKSMKGTP**YVMAPEVILQGHFSFADWS** 249
ANP3 **PSPVITTYNQALLGLEYLEHMAIMHRDIK** GANILVD**MKGCKLADFGASKQVVELATMT** GAKSMKGTP**YVMAPEVILQGHFSFADWS** 258
NPK1 **PESVVRITTYNQALLGLEYLEHMAIMHRDIK** GANILVD**MKGCKLADFGASKQVVELATMT** GAKSMKGTP**YVMAPEVILQGHFSFADWS** 270

ANP11 **VGCTVIEATGHPAPWSQQYKVAALFFHIGT** TKSHPP**IPDITLSSDARDFLAKCLQEVNLR** PTASELL**KHPFVMEHKSASTDLGSLVNL** 349
ANP2 **VGCTVIEATGHPAPWSQQYKVAALFFHIGT** TKSHPP**IPDITLSSDARDFLAKCLQEVNLR** PTASELL**KHPFVMEHKSASTDLGSLVNL** 339
ANP3 **VGCTVIEATGHPAPWSQQYKVAALFFHIGT** TKSHPP**IPDITLSSDARDFLAKCLQEVNLR** PTASELL**KHPFVMEHKSASTDLGSLVNL** 348
NPK1 **VGCTVIEATGHPAPWSQQYKVAALFFHIGT** TKSHPP**IPDITLSSDARDFLAKCLQEVNLR** PTASELL**KHPFVMEHKSASTDLGSLVNL** 360

ANP15
ANP11 **LSTPLFLQINNTKSTPDSTCDDVGDMCNFG** SLNYS**VDVPVKSIQMKNL---WQONDNGG** EDDMCL**IDDENSLTFDGEMSSITLKDCHLK** 436
ANP2 **SCSPLPSELNTITSYQTSDDVGDI CNLG** SLTCT**AFPEKSIQMSLCLKSNNGYDDDD** DNDMCL**IDDENSLTYNGETGPSLDNNTDAK** 429
ANP3 **GNPITTOGMNVRSSINSLIRRTCSGLKDV** CELGS**LRSEIITYPQKSN---SGFGWRDGT** SDDL**CQTDMDLNCIESVRNNVLSOSTDLN** 431
NPK1 **PENMAAQRMDVRTS1-1PDMRASCNGLKDV** CGVSA**VRCSTVYPDMSLG--KESLWKLGN** DDDM**COMNDDMFGA5VKCSDDLHSPANY** 447

A

ANP11 **KSCDDISDMSIALKSKPDESPGNGE-----** KESTMS**MECDQPS** YSEDD**DELTESKIKAFIDERAADLKLQTP** 504
ANP2 **KSCDTWSEISDILKCKFDENSGNGE-----** TETKVS**MEVDHPS** YSEDEN**ELTESKIKAFIDERAADLKLQTP** 497
ANP3 **KSFNPKCDSTDNWSCKPDESPKVMXSKSNL** LSYQAS**LOLQ---** VPCD**ETELTFAGGS** VAE**DDYKCTELKINSFLDERAADLKLQTP** 527
NPK1 **KSFNPKCEPDNDWPKPDESPBELTKSQANL** HYDQAT**IKPTNNPIMSYPEDLAFTFPGQS** AAEDD**DELTESKIKAFIDERAADLKLQTP** 537

B

C

ANP11 **LYDEPTNGLITFSESCMESNLNSKREDTA** RGFLK**LPPKSRSPSGPLGGSBSRATDAS** ---CSK**SPGSGGSRELMINNGGDEASQDGV** 593
ANP2 **LYDEPTNGLITFSESCMESNLNSKREDTA** RGFLK**LPPKSRSPSGPLGGSBSRATDAS** ---CSK**SPGSGGSRELMINNGGDEASQDGV** 583
ANP3 **LYDEPTNGLITFSESCMESNLNSKREDTA** RGFLK**LPPKSRSPSGPLGGSBSRATDAS** ---CSK**SPGSGGSRELMINNGGDEASQDGV** 583
NPK1 **LYDEPTNGLITFSESCMESNLNSKREDTA** RGFLK**LPPKSRSPSGPLGGSBSRATDAS** ---CSK**SPGSGGSRELMINNGGDEASQDGV** 618

D

ANP11 **SARVTDWAGLVVDTKQELSQCVALSELEK** WKDEL**DOELERKREITRQACMGSSERDRG** MSRQ**REKSRFASPGK** 666
ANP2 **PTOVNESTKKGVNNEF-----CFSEIRRR** WKDEL**DOELERKREITRQACMGSSERDRS** LSE**IRDRKSRFASPGK** 642
ANP3 **PTOVNESTKKGVNNEF-----CFSEIRRR** WKDEL**DOELERKREITRQACMGSSERDRS** LSE**IRDRKSRFASPGK** 653
NPK1 **LPRHNEWKDLLGSQREAVNS--SFSEIRRR** WKDEL**DOELERKREITRQACMGSSERDRS** LSE**IRDRKSRFASPGK** 690

E

FIGURE 11

FIGURE 12

ANP1

Amino Acid Sequence

GSVRRSLVFRPSSDDDNQENQPPFPGVLADKITSCIRKSKIFIK
PSFSPPPPANTVDMAPPISWRKGQLIGRGAFGTVMGMNLDSEGLAVKQVLIAANFA
SKEKTQAHIQELEEEVKLLKNLSHPNIVRYLGTVREDDTLNILLEFVPGGSISSLLEK
FGPFPEVVRTYTROLLGLLEYLHNHAIMHRDIKANILVDNKGCIKLADFGASKQVA
ELATMTGAKSMKGTPTYWMAPEVILQTHGSFSADIWSVGCTVIEMVTGKAPWSQOYKEV
AAIFFIGTTKSHPPIDPDLSSDAKDFLLKCLQEVNLRPTASELLKHPFVMGKHKESA
STDIGSVLNNLSTPLPLQINNNTKSTPDSTCDDVGDMCNFGSLNYSLVDPVKSIQNKNL
WQONDNGGDEDDMCLIDDENFLTDFGEMSSLEKDCHLKSCDDISDMSIALKSKFDE
SPGNKEKESTMSMECDQPSYSEDDDELTESKIKAFLEKAAADLKKLQTPLYEEFYNSL
ITFSPSCMESNLSNSKREDTARGFLKLPPKSRSPSRGPLGGSPSRATDATSCSKSPGS
GGSRELNINNGGDEASQDGV SARVTDWRGLVVDTKQELSQCVALSEIEKKWKEELDQ
LERKRQEIMRQAGLGSSPRDRGMSRQREKSRFASPGK

ANP1

Nucleotide Sequence

1 cggctccgtt cgtcgatcgc ttgttttccg tccttcttcc gacgacgata accaggagaa
61 ccagccctccg ttccccggtg ttctcgccga taagatcacc tcttgcaccc gcaaatcgaa
121 gattttttatc aaacctctct tctcgccctcc tcctcctgct aacactgtag acatggcacc
181 tccgattttcg tggaggaaaag gtcagttaat tggtcgcggc gcgtttgga cgggtatcat
241 gggatataaat cttgactccg gggagcttct cggcgtcaaa cagggttctga ttgcagccaa
301 ttttgcttcc aaggaaaaga ctcagggtca tttcaggag cttgaagaag aagttaagct
361 tcttaaaaaat ctctcccatc ctaatatagt tagatatttg ggtacagtga gggagatga
421 taccctgaat atccttctcg agtttggtcc cggtgatcgc atatcatcgc tcttggagaa
481 atttgagacct ttctctgaat cagttgtccg gacatacaca agccaactgc ttttaggggt
541 ggagtacctg cacaatcatg caattatgca cagagacatt aagggggcta atctcttgt
601 ggataataaaa ggatgcatta agcttgcctga ttttggtgca tccaaacaag tagctgagtt
661 ggctacgatg actggtgcaa aatctatgaa agggacacca tattggaagg ctccggaagt
721 tatccttcaa actggacata gcttctctgc tgacatatgg agcgtcggct gtacagttat
781 tgaaatggtg actgggaagg ctccttggag tcagcagtat aaagaggttg ctgctatctt
841 cttcatagga acaacaaaat cacatcctcc aatacctgat actctctcct ctgatgcaaa
901 agattttctc cteaaagtgc tgcaggaggt accaaatctg cggccaaccg catctgagct
961 actaaaqcat ccttttggtt tggggaaaaca caaggagctc gcttctactg atcttgggtc
1021 tgtcctgaac aatcttagca ctccactacc gttacagata aataacacca agagcactcc
1081 agattctact tgcgacgatg taggtgacat gtgtaacttt ggcagtttga attattcact
1141 tgtagatcct gtgaaatcaa tccaaaacaa aaatttatgg caacaaaatg ataatggagg
1201 tgatgaagac gatatgtgtt tgatagatga tgagaatttc ttgacatttg acggagaaat
1261 gagttctacc cttgaaaaag attgtcatct gaagaagagc tgtgatgaca taagtgatat
1321 gtccattgct ttgaagtcca aatttgacga aagtcctggt aatggagaga aagagtctac
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1441 aaaaattaaa gctttcttag atgagaaggc tgcagatcta aagaagttac agactcctct
1501 ctatgaagaa ttctacaata gtttgatcac attctctccc agttgtatgg agagtaattt
1561 aagtaacagt aaaagagagg acactgctcg tggtttctcg aaactgcctc caaaaagcac

FIGURE 12

```
1621 gtcaccgagt cggggccctc ttggtggttc accttcaaga gcaacagacg caactagttg
1681 ttccaagagc ccagcaagtg gaggtagtcg tcaattgaat attaacaatg gaggtgatga
1741 agcttcacag gatggtgtat cagcacgggt cacagactgg aggggcctcg ttgttgacac
1801 taagcaggaa ttaagccagt gtgttgcttt gtcagagata gagaagaagt ggaaggaaga
1861 gcttgatcaa gaactggaaa gaaagcgaca acaaatcatg cgccaagcag ggttgggac
1921 atccccaaga cacagaggca tgagccgaca gagagagaaq tcgaggtttg catcaccagg
1981 aaaatgactt gcacaaaaag tctccggctt ttgattttt gattgctcaa ctagtatata
2041 tatctgtaac tcttatctcg ctgtgatgaa aagtagacac gaggtttggt ctgaatatat
2101 gattctgaac tggttgttga aggtattaga tgtgtgtaat gtgagtgtcg ggtgc
```

FIGURE 13

ANP2

Amino Acid Sequence

RSLVFRSTTDDENQENHPPFPFSLADKITSCIRKSMVFAKSQS
 PPNNSTVQIKPPIRWRKGQIJGRGAFGTVYMGMNLDSEGLLAVKQALITSNCASKEKT
 QAHIQELEEEVKLLKNLSHPNIVRYLGTVREDETLNILLEFVPGGSISSLLEKFGAFP
 ESVVRTYTNTQLLGLLEYLHNHAIMHRDIKGANILVDNQGCIKLADFGASKQVAELAT1
 SGAKSMKGTPLYWMAPEVILQTHSFSADIWSVGCTVIEMVTGKAPWSQOYKEIAAIFH
 IGTTKSHPPPIPDNISSDANDFLLKCLQOEPNLRPTASELLKHPFVTGKQKESASKDLT
 SFMDNSCSPLPSELNITSYQSTSDVDGDI CNLGS LTCTLAFPEKSIQNNSLCLKSN
 NGYDDDDNDMCLIDDENFLTYNGETGPSLDNNTDAKKSCDTMSEISDILKCKFDENE
 GNGETETKVSMEVDHPSYSEDENELTESKIKAFLLDDKAAELKKLQTPLYEEFYNGMIT
 CSPICMESNINNNKREEAPRGFLKLPPKSRSPSQGHIGRSPSRATDAACCSKSPESGN
 SSGAPKNSNASAGAEQESNSQSVALSEIERKWKEELDQELERKRREITRQAGMGSSPR
 DRSLSRHREKSRFASPGK

ANP2

Nucleotide Sequence

```

1  cgctcacttg tcttccgttc taccaccgac gatgagaatc aagagaatca tctcctcccg
61  tttcctttctc tcttcgccga taaaatcact tctgtatcc gcaaatcaat ggttttcgcc
121 aaatcccagt cacctccgaa taactccacc gtacaaatca aacctccgat tcggtggcgc
181 aaaggtcagt taattgccgc tggcgctttt ggtactgtgt atatgggtat gaatctcgat
241 tccggtgagc ttctcgccgt taaacaggct ctgattacat ctaattgtgc atccaaggaa
301 aaaactcagg ctcatattca ggagcttgaa gaggaagtga agctactcaa gaatctctct
361 catccaaata tagttagata ttgggtacg gtgagggaag atgaaacttt gaatatcttg
421 cttgaatttg ttctggtgg atctatatct tcactcttgg agaaatttgg agcctttcct
481 gaatctgttg ttcgacata cacgaaccaa ctgcttttgg gattggagta ccttcataat
541 catgccatta tgcaccgtga cattaagggt gctaatatcc ttgtggataa tcaaggatgc
601 attaaacttg ctgatttttg tgcgtccaaa caggtagcgg agttggctac tatttcgggt
661 gccaaatcta tgaaggaac tccctattgg atggctccag aagttattct tcaaaccggg
721 catagctttt ctgctgatat ttggagtgtg gcatgcacag tgattgaaat ggtgactgga
781 aaagctcctt ggagccagca atataaagag attgctgcta tttccacat tggaaacgag
841 aaatcgcatc ctccaatccc tgacaatate tctctgacg caaatgattt ttgctcaag
901 tgtctgcagc aggaacaaaa tctgcccga accgcttctg agctgctaaa gcatccattt
961 gttacgggca aacagaagga atctgcgtct aaagatctta cttcatttat ggacaattca
1021 tgcagtcctt taccatcaga gttgactaac attacgagct atcaaacatc tacgagtga
1081 gatgtaggag acatctgtaa cttgggtagt ctgacttgta cacttgcttt ccctgagaaa
1141 tcaatccaaa ataacagttt gtgtctgaaa agtaataacg ggtatgatga ccatgatgat
1201 aatgatatgt gtttgattga cgatgagaat ttcttgacat ataatggaga gactggccct
1261 agtcttgaca ataatactga tgccaagaag agctgtgata ccatgagtga gatctctgat
1321 attttgaaat gcaaatttga cgaataattc ggaacaggag aaacagagac gaaagttagt
1381 atggaagttg accatccatc atactcggag gatcaaaatg agctgactga gtcgaaaatc
1441 aaagctttct tagatgacaa ggctgcagag ttaaaagaat tacagacgcc tctgtacgaa
1501 gaattctaca acggtatgat cacatgctcc cccatctgca tggagagtaa catcaataac
1561 aataaacgag aggaggcacc tcgtggtttc ttgaaactgc ctccaaaaag tcggtctccc

```

FIGURE 13

```
1621 agtcaggccc atattggtcg atcaccttct agagccaacag atgcagcctg ttgttccaag
1681 agtccagaaa gtggtaatag ctctggtccc ccgaagcaata gcaatgcaag tgctggtgct
1741 gaacaagaat caaacagtca aagtgtcgcg ctgtcgcaga tagagaggaa gtggaaggaa
1801 gagcttgatc aagaacttga aagaaagcga agagagatta cacggcaagc agggatggga
1861 tcatccccga gagatagaaq cttgagccga catagagaga agtcaagatt tgcattctca
1921 ggc aaatgat ctgtacaaaa gaaaagcagc caattttgca cttttgtctg taaggcttgt
1981 attgcttttg atctttcgat ttgtctatct agtatatatg atatagacat aaaattgtgc
2041 caacttaaaq tttgaatata tatagatagc taaactatth gcttaagtag ggtgtgatgt
2101 gagaatgttg gtccatattg agtggttaagc caaccacaga acaaatatth tcgagaaatt
2161 atcgaaagct ttgtttactt tcggtccggt ccg
```

FIGURE 14

ANP3

Amino Acid Sequence

MDILGSVRRSLVFRSSLAGDDGTSGGGLSGFVGKINSSIRSSR
JGLFSKPPPGLPAPRKEEAPSIRWRKGELIGCGAFGRVYMGMLDSEGLLAIKQVLIA
PSSASKEKTQGHIRELEEEVQLLNLSHPNIVRYLGTVRESDSLNLMEFVPGGSISE
LLEKFGSFPEPVIIMYTKQLLLGLEYLHNNGIMHRDIKGANILVDNKGCIRLADFGAS
KKVVELATVNGAKSMKGTPTYWMAPEVILQTHGSFSADIWSVGCTVIEMATGKPPWSEQ
YQOFAAVLHI GRTKAHPPI PEDLSPEAKDFLMKCLHKEPSLRLSATELLQHPFVTGKR
QEPYPAYRNSLTECGNPITTOGMNVRSSINSLIRRSTCSGLKDVCELGSLRSSIIYPQ
KSNNSGFGWRDGDSDDLCTDMDLNCNIESVRNVLSSQSTDNLKSFNPMCDSTDNWSC
KFDESPKVMKSKSNLLSYQASQLQTVPCDEETSLTFAGGSSVAEDDYKGTCLKIKSF
LDEKAQDLKRLQTPLLLEEFHNAMNPGI PQGALGDTNIYNLPNLPSISKTPKRLPSRRL
SAISDAMPSPLKSKRTLNTSRVMQSGTEPTQVNESTKKGVNNSRCFSEIRRKWEEEL
YEELERHRENLRHAGAGGKTPLSGHKC

ANP3

Nucleotide Sequence

```
1  tcttcactga tctctctaca cattcacggt cggcttctca aatgcaggat attctcggat
61  cggttcgccg atccttggtt ttccggtcgt ctttggccgg agacgatggt actagcggcg
121 gaggtcttag cggattcgtc gggaaagatta actctagtat ccgtagctct cgaattgggc
181 tcttttctaa gccgcctcca gggcttctct ctcctagaaa agaagaagcg ccgtcgattc
241 ggtggaggaa aggggaatta atcggttgct gtgcttttgg aagagtttac atgggaatga
301 acctcgattc cggcgagctt ctgcgaatta aacaggtttt aatcgctcca agcagtgctt
361 caaaggagaa gactcagggt cacatccgag agcttgagga agaagtacaa cttcttaaga
421 atctttcaca tccgaacatc gttagatact tgggtactgt aagagagagt gattcgttga
481 atattttgat ggagtttggt cctgggtgat caatatcatc tttgttggag aagtttggat
541 cttttcctga gcctgtgatt attatgtaca caaagcaact tctgcttggg ctggaatata
601 ttcacaacaa tgggatcatg catcgagata ttaagggggc aaatatattg gtcgataaca
661 aaggttgcat cagactcgca gattttggtg cttccaagaa agttgtagag ctgactactg
721 tsaatggtgc caaatctatg aaggggacgc cttattggat ggctcctgaa gtcattctcc
781 agactggtca taqcttctct gctgatatat ggagtgttgg gtgcactgtg attgagatgg
841 ctacggggaa gcctccctgg agcgagcagt atcagcagtt tgctgctgtc cttcatattg
901 gtagaacaata agctcactct ccaattccag aagacctctc accagaggct aaagactttc
961 taatcaaatg cttacacaaa gaaccaagct tgagactctc tgcaaccgaa ttgcttcagc
1021 acccgtttgt cactgcaaaag cggcaggaaac cttatccagc ttaccgtaat tctcttacgg
1081 aatgtggaaa cccaataact actcaaggaa tgaatgttcg gagttcaata aattcgttga
1141 tcaggagggtc gacatgttca ggcttgaaagg atgtctgtga actgggaagc ttgaggagtt
1201 ccattatata ccacagaag tcaataaact caggatttgg ttggcgagat ggagactctg
1261 atpacctttg tcagaccgat atggatgata tctgcaacat tgaatcagtc agaaacaatg
1321 tttgtcaca gtccaccgat ttaacaaga gttttaatcc catgtgtgat tccacggata
1381 actggtcttg caagtttgat gaaaagccaa aagtgatgaa aagcaaatct aacctgcttt
1441 cttaccaagc ttctcaactc caaactggag ttccatgtga tgaggaaaacc agcttaacat
1501 ttgctggtgg ctcttcggtt gcagaggatg attataaagg cacagagttg aaaataaaat
1561 catttttggg tgagaagcgt caggatttga aaagggttga gacctctctg cttgaagaat
1621 tccacaatgc tatgaatcca ggaatacccc aagggtgact tggagacacc aatatctaca
```

FIGURE 14

```
1681 atttaccaaa cttaccaagt ataagcaaga cacctaaacg acttccgagt agacgactct
1741 cagcaatcag tcatgctatg cccagcccac tcaaaagctc caaacgtaca ctgaacacaa
1801 gcagagtgat gcagtcaggc actgaaccaa ctcaagtcaa cgagtcgacc aagaaggagg
1861 taaataatag ccgttgtttc tcagagatac gtcggaagtg ggaagaagaa ctctatgaag
1921 agcttgagag gcatcgagag aatctgccac acgctggtgc aggagggaag actccattat
1981 caggccacaa aggatagtga acggctaaaag acaaaactga tgtttctttc ttatgtttca
2041 aaattacttc ttctgtatgtt tttttgttgg tggggtaatt tcatgagcta gtatgatata
2101 tgtagatagt tcttcaacgg ttacatagta ttattattta ttattaattt aattgcc
```

FIGURE 15

NPK1

Amino Acid Sequence

MODFIGSVRRSLVFKQSGDFDTGAAGVGSGFGGFVEKLGSSIRK
 SSIGIFSKAHVPALPSISKAE LPAKARKDDTPPIRWRKGEMIGCGAFGRVYMG MNVDS
 GELLAIKEVSIAMNGASRERAQAHVRELEEEVNLLKNLSHPNIVRYLGTAREAGSLNI
 LLEFVPGGSISSLLGKFGSPFESVIRMYTKQLLLGLEYLHKNGIMHRDIKGANILVDN
 KGCIKLADFGASKKVVELATMTGAKSMKGT PYWMAPEVILQTGHSFSADIWSVGCTII
 EMATGKPPWSQQYQEVAA LFHIGTTKSHPP IPEHLSAESKDFLLKCLQKEPHLRHSAS
 NLLQHPFVTAEHQEARPFLRSSFMGNPENMAAQ RMDVRTSIIIPDMRASCNGLKDVCGV
 SAVRCSTVYPENSLGKESLWKLGN SDDDMCQMDNDDFMFGASVKCSSDLHSPANYKSF
 NPMCEPDNDWPCKFDESPELTKSQANLHYDQATIKPTNNPIMSYKEDLAFTFPGQSA
 AEDDDDELTESKIRAF LDEKAMD LKKLQTPLYEGFYNSLVNSSTPSVGTGNKENVPSN
 INLPPKSRSPKRMLSRR LSTAIEGACAPSPVTHSKRISNIGGLNGEAIQEAQLPRHNE
 WKDLLGSQREAVNSSFSERQRRWKEELDEELORKREIMRQAVNLSPPKDPILNRCRSK
 SRFASPGR

NPK1

Nucleotide Sequence

1	ctgaacccta	acgcacacaa	cttcactctt	tgcctctcca	aatctctctc	caatgcagga
61	tttcatcggc	tccgttcgcc	gattctctgg	tttcaagcag	tccggagact	tcgataccgc
121	cgctgccggg	gtcggcagcg	gattcggagg	cttcgttgag	aaactagggt	cgagcattcc
181	caaatcgagt	attggaatct	tctcgaaagc	tcatgttcct	gctcttccgt	ctatttctaa
241	agctgagctg	cccgcgaagg	ctcggaaaag	tgcactccg	ccaatccggt	ggaggaaaag
301	tgaatgatt	ggatgtggg	cttttggtag	ggtttatatg	gggatgaatg	ttgattctgc
361	agagttactc	gctataaagg	aggtttcgat	tgcgatgaat	ggtgcttcga	gagagcgagc
421	acaagctcat	gtagagagc	ttgaggaaga	agtgaatcta	ttgaagaatc	tctcccatcc
481	caacatagtg	agatatttgg	gaactgcaag	agaggcagga	tcattaaata	tattgttgga
541	atttggtcct	ggtggctcaa	tctcgtcact	tttgggaaaa	tttggatcct	tccttgaatc
601	tgttataaga	atgtacacca	agcaattggt	attagggttg	gaatacttgc	ataagaatgg
661	gattatgcac	agagatatta	agggagcaaa	catacttggt	gacaataaag	gttgcattaa
721	acttgctgat	ttcgggtgat	ccaagaaggt	tgttgaattg	gctactatga	ctggtgccaa
781	gtcaatgaag	ggtactccat	actggatggc	tcccgaagtc	attctgcaga	ctgcccatag
841	cttctctgct	gacatatgga	gtgtcggatg	cactattatc	gaaatggcta	caggaaaaacc
901	tccttgagag	cagcagtatc	aggaggttgc	tgcctctctc	catataggga	caaccaaatac
961	ccatcccccc	atcccagagc	atctttctgc	tgaatcaaag	gacttccctat	taaaatgttt
1021	gcagaaggaa	ccgcacctga	ggcattctgc	atcaaatttg	cttcagcatc	catttggttac
1081	agcagaacat	caggaaagctc	gcccttttct	tcgctcatcc	tttatgggaa	accccgaaaaa
1141	catggcggcg	caaaggatgg	atgttaggac	ctcaatcatt	cctgatatga	gagcttctcg
1201	caatggtttg	aaagatgttt	gtgggtgttag	cgctgtgagg	tgcctccactg	tatatcccgaa
1261	gaattcctta	ggcaaaagag	cactctggaa	actaggaaac	tctgatgatg	acatgtgccaa
1321	gatggataat	gatgatttta	tgtttgggtgc	atctgtgaaa	tgcagttcag	atttgcattc
1381	tcttgctaata	tataagagtt	ttaatcctat	gtgtgaacct	gataacgatt	ggccatgcaa

FIGURE 15

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1441 atttgcagaa agtccccgagt tgacgaaaaag tcaagcaaac ctgcattatg atcaagcaac
1501 tattaagccc actaataacc ccatcatgtc atacaaggag gatcttgctt tcacatttcc
1561 aagtgggcaa tctgcagccg aggatgatga tgaattgaca gagtctaaaa ttagggcatt
1621 ccttgatgaa aaggcaatgg acttgaagaa gctgcaaaaca ccactatatg aaggattcta
1681 caattccttg aatgtttcca gcacaccgag tcccgttggc actgggaaca aggaaaatgt
1741 tccaagtaac ataaacttac caccaaaaaag caggtcacca aaacgtatgc ttagcagaag
1801 gctctctact gccattgaag gtgcttgtgc tcccagccca gtgactcatt ccaagcgaat
1861 atcaaataat ggtggcctaa atggtgaagc tattcaggaa gctcagttgc cgaggcataa
1921 tgaatggaaa gatcttcttg gttctcaacg tgaagcagtt aattcaagct tctctgagag
1981 gcaaaagaag tggaaaagaag agcttgatga agagttgcaa aggaaacgag agattatgcg
2041 tcaggcagtc aacttatcac caccaaaagga tccaattcta aatcgatgta gaagtaaatc
2101 aagggtttgca tctcctggaa gataaatgta tgtacttgtg tccctaaact aaagtcagtt
2161 tgaagaatat aattaatgat cctgcaaccg cagaacagag agttagatgt cttgagcagg
2221 tatacgaacg tgagggttttc ttgaccggtt actacaggaa tatcagcgtt tgtcagatag
2281 agtgagctgt tactacagga atatctgtca acctgttaat catattataa aatgccaata
2341 atttgcgttg tattcgtttt gatcattctc ctgagagcat tgtaagaaaa atgcaggcct
2401 ttttataacc tatataagtg ctctctcatg gtagtggcca atattaaaac gcagagaaaa
2461 gtcgagttct catctgctga attgtttgta aaatgtgata tattaatgta tttaccgtct
2521 tacaacc
```


FIGURE 16

Kinase Domains (Amino Acid Sequence)

ANP1

PPISWRKGQLIGRGAFGTVMGMNLDSEGLLAVKQVLIANFASKEKTOAHIQELEEVEVKLLKNLSHPNIVRYLGTVR
EDDTLNILLEFVPGGSISSLLEKFGPFPEVVRTYTRQLLLGLEYLHNHAIMHRDIKGANILVDNKGCIKLADFGASK
QVAELATMTGAKSMKGTPYWMAPEVILQTHGSFSADIWSVGCTVIEMVTGKAPWSQQYKEVAIAIFFIGTTKSHPPIPD
TLSSDAKDFLKCLQEVNLRPTASELLKHPFVM

ANP2

PPIRWRKGQLIGRGAFGTVMGMNLDSEGLLAVKQALITSNCASKEKTOAHIQELEEVEVKLLKNLSHPNIVRYLGTVR
EDDTLNILLEFVPGGSISSLLEKFGAFPEVVRTYTNQLLLGLEYLHNHAIMHRDIKGANILVDNKGCIKLADFGASK
QVAELATISGAKSMKGTPYWMAPEVILQTHGSFSADIWSVGCTVIEMVTGKAPWSQQYKEIAAIFHIGTTKSHPPIPD
NISSDANDFLKCLQEPNLRPTASELLKHPFVT

ANP3

PSIRWRKGELJGCGAFGRVVMGMNLDSEGLLAIKQVLIAPSSASKEKTOGHIRELEEVEVOLLKNLSHPNIVRYLGTVR
ESDSLNIIMEFVPGGSISSLLEKFGSFPPEVIMYTKQLLLGLEYLHNNGIMHRDIKGANILVDNKGCIKLADFGASK
KVVELATVNGAKSMKGTPYWMAPEVILQTHGSFSADIWSVGCTVIEMATGKPPWSEQYQOFAAVLHIGRTKAHPPIPE
DLSPEAKDFLMKCLHKEPSLRLSATELLQHPFVT

NPK1

PPIRWRKGEMJGCGAFGRVVMGMNVDSGELLAIKEVSIAMNGASRERAQAHVRELEEVEVLLKNLSHPNIVRYLGTAR
EAGSLNILLEFVPGGSISSLLGKFGSFPESVIRMYTKQLLLGLEYLHNKNGIMHRDIKGANILVDNKGCIKLADFGASK
KVVELATMTGAKSMKGTPYWMAPEVILQTHGSFSADIWSVGCTIEMATGKPPWSQQYQVEAALFHIGTTKSHPPPIPE
HLSAESKDFLKCLQEPHLRHSASNLLQHPFVT

Kinase Domains (Nucleotide Sequence)

ANP1

cc
181 tccgatttcg tggaggaaaag gtcagttaat tggtcgcggc gcgttttgta cgggtgtacat
241 gggatatgaat cttgactccg gggagcttct cggcgtaaaa caggttctga ttgcagccaa
301 ttttgcttcc aaggaaaaga ctacagctca tattcaggag ctggaagaag aagttaagct
361 tcttaaaaat ctctcccatc ctaatatagt tagatatattg ggtacagtga gggaaagatga
421 taccctgaat atccttctcg agtttcttcc cggtggatcg atatcatcgc tcttgagaa
481 atttggacct tttcctgaat cagttgtccg gacatacaca aggcaactgc ttttaggggt
541 ggagtacctg cacaatcatg caattatgca cagagacatt aagggggcta atatccttgt
601 ggataataaa ggatgcatta agcttctga ttttggtgca tccaaacaag tagctgagtt
661 ggctacgatg actggtgcaa aatctatgaa agggacacca tattggaagg ctccggaagt
721 tatccttcaa actggacata gcttctctgc tgacatatgg agcgtcggct gtacagttat
781 tgaatggtg actgggaagg ctcttggag tcagcagtat aaagaggttg ctgctatctt
841 cttcatagga acaacaaaat cacatctcc aatacctgat actctctcct ctgatgcaaa
901 agattttctg ctcaagtgtc tgcaggaggt accaaatctg cggccaaccg catctgagct

FIGURE 16

961 actaaagcat ccttttgtta tc
 ANP2
 cctccgat tcggtggcgc
 181 aaaggtcagt taattggccc tggcgctttt ggtactgtgt atatgggtat gaatctcgat
 241 tccggtgagc ttctcgccgt taaacaggct ctgattacat ctaattgtgc atccaaggaa
 301 aaaactcagg ctcatattca gcagcttgaa gaggaagtga agctactcaa gaatctctct
 361 catccaaata tagttagata ttgggtacg gtgagggag agcaaaacttt gaatatcttg
 421 cttgaatttg ttcttggtgg atctatatct tcaactttgg agaaatttgg agcctttcct
 481 gaatctggtg ttccggacata caccaaccaa ctgcttttgg gattggagta ccttcataat
 541 catgccatta tgcaccgtga cattaagggt gctaataatc ttgtggataa tcaaggatgc
 601 attaaacttg ctgatttttg tgcgtccaaa caggtagcgg agttggctac tatttcgggt
 661 gccaaatcta tgaaaggaaac tccctatttg atggctccag aagttattct tcaaacgggc
 721 catagctttt ctgctgatat ttggagtga ggatgcacag tgattgaaat ggtgactgga
 781 aaagctcctt ggagccagca atataaagag attgctgcta tttccacat tggacgacg
 841 aaatcgcatc ctccaatccc tgacaatatc tctctgacg caaatgattt ttgtctcaag
 901 tgtctgcagc aggaaccaa tctgcggcca accgcttctg agctgctaaa gcatccattt
 961 gttacc
 ANP3
 ccgtcgattc
 241 ggtcgaggaa aggggaatta atcggttgcg gtgcttttgg aagagtttac atgggaatga
 301 acctcgattc cggcgagctt ctgcgaatta aacagggttt aatcgctcca agcagtgctt
 361 caaaggagaa gactcagggc cacatccgag agcttgagga agaaatataa cttcttaaga
 421 atctttcaca tccgaacatc gttacatact tgggtactgt aagagagagt gattcggtga
 481 atattttgat ggagtttgtt cctgggtgat caatatcatc ttgtttggag aagtttggat
 541 cttttcctga gcctgtgatt attatgtaca caaagcaact tctgcttggg ctggaatatc
 601 ttcacaacaa tgggatcatg catcgagata ttaagggggc aaatattttg gtcgataaca
 661 aaggttgcat cagactcga cattttgggt cttccaagaa agttgtagag ctagctactg
 721 taaatgggtg caaatctatg aaggggacgc cttattggat ggcctcctga gtcattctcc
 781 agactggtca tagcttctct gctcatatat ggagtgttgg gtgactgtg attgagatgc
 841 ctacggggaa gcctccctgg agcgaagct atcagcagtt tgcctgctgc cttcatattg
 901 gtagaacaac agctcatcct ccaattccag aagacctctc accagaggct aaagactttc
 961 taatgaaatg cttacacaaa caaccaagct tgagactctc tgaaccgaa ttgcttcagc
 1021 acccgtttgt cact
 NPK1
 ccg ccaatccggt ggaggaaaagc
 301 tgaatatgatt ggatgtggtg cttttggtag ggtttatatg gggatgaatg ttgattctgc
 361 agagttactc gctataaagg aggtttcgat tgcgatgaat ggtgcttcga gagagcgagc
 421 acaagctcat gttagagagc ttgaggaaga agtgaatcta ttgaagaatc tctcccatcc
 481 caacatagtg agatatttgg caactgcaag agaggcagga tcattaaata tattgttggg
 541 atttgttctt ggtggctcaa tctgctcact tttgggaaaa ttggaatcct tccctgaatc
 601 tgttataaga atgtacacca agcaattggt attagggttg gaatacttgc ataagaatgg
 661 gattatgcac agagatatta agggagcaaa catacttgtt gacaataaag gttgcattaa
 721 acttgctgat ttcggtgat ccaagaagg tgttgaattg gctactatga ctggtgccaa
 781 gtcaatgaag ggtactccat actggaatgg tcccgaagtc attctgcaga ctggccatag

FIGURE 16

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841 cttctctgct gacatatgga gtgtcggatg cactattatc gaaatggcta caggaaaacc
901 tccttggagc caqcagtatc aggaggttgc tctctcttc catataggga caaccaaatc
961 ccatccccc atcccagagc atctttctgc tgaatcaaag cacttcctat taaaatgttt
1021 gcagaaggaa ccgcacctga ggcattctgc atcaaatttg cttcagcatc catttgttac
1081 a
```